



KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

VP-81K

8x1 UXGA/Audio Switcher

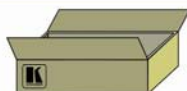
P/N: 2900-000387 Rev 3

VP-81K Quick Start Guide

This page guides you through a basic installation and first-time use of your **VP-81K**. For more detailed information, see the **VP-81K** User Manual. You can download the latest manual at <http://www.kramerelectronics.com>.

Step 1: Check what's in the box

- | | |
|--|--|
| <input checked="" type="checkbox"/> VP-81 8x1 UXGA/Audio Switcher | <input checked="" type="checkbox"/> 1 User Manual |
| <input checked="" type="checkbox"/> 1 Power cord | <input checked="" type="checkbox"/> 1 Null-modem adapter |
| <input checked="" type="checkbox"/> 1 Set of rack "ears" | <input checked="" type="checkbox"/> Windows®-based Kramer control software |
| <input checked="" type="checkbox"/> 4 Rubber feet | <input checked="" type="checkbox"/> Kramer RC-IR3 Infrared Remote Control |
| <input checked="" type="checkbox"/> 1 Quick Start sheet | Transmitter with batteries and user manual |



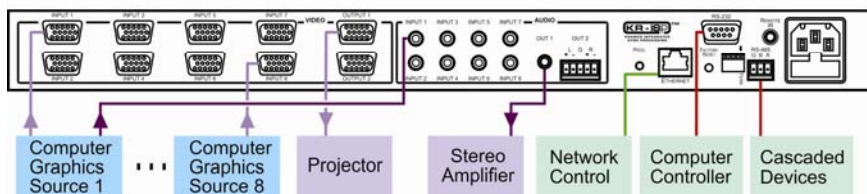
Save the original box and packaging in case your **VP-81K** needs to be returned to the factory for service.

Step 2: Install the VP-81K

Mount the machine in a rack (using the included rack "ears") or attach the rubber feet and place on a table.

Step 3: Connect the inputs and outputs

Always switch off the power on each device before connecting it to your **VP-81K**.



Always use Kramer high-performance cables for connecting AV equipment to the **VP-81K**.

Step 4: Connect the power

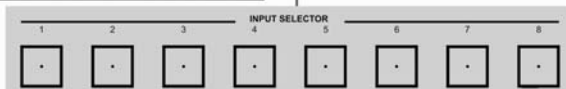
Connect the power cord to the **VP-81K** and plug it into the mains electricity.



Step 5: Operate the VP-81K

Use the **SELECTOR** buttons to switch the inputs to one or both identical outputs

Lock the front panel via RS-232



AUDIO and VIDEO - Audio follows video when switching
VIDEO - Switches the video signal
AUDIO - Switches the audio signal



Increase or decrease the **AUDIO GAIN** (while the **AUDIO** button illuminates)

Operate via the front panel buttons, IR remote controller, RS-232, RS-485 and the Ethernet

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Products.

Congratulations on purchasing your Kramer **VP-81K 8x1 UXGA/Audio Switcher**, which is ideal for the following typical applications:

- Display systems requiring simple input selection
- Remote monitoring of computer activity in schools and businesses
- Rental/staging applications
- Multimedia and presentation source selection

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
 - Use Kramer high performance high resolution cables
 - Use only the power cord that is supplied with this machine



Go to <http://www.kramerelectronics.com> to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **VP-81K** away from moisture, excessive sunlight and dust

3 Overview

The **VP-81K** is a high-performance switcher for computer graphics video signals, with resolutions up to and exceeding UXGA, and unbalanced stereo audio signals. The unit can switch any one of eight inputs to two identical video outputs, one balanced and one unbalanced stereo audio outputs.

The **VP-81K** features:

- Very high video bandwidth, ensuring transparent UXGA performance
- Audio-follow-video (AFV) in which all operations relate to both the video and the audio channels, or audio breakaway option, in which video and audio channels switch independently
- Volume control
- DDC (Display Data Channel) communication between the selected input and output 1 high-density 15-pin HD connectors on pins 12 and 15
- KR-ISP™ technology, innovative integrated sync processing that lets you achieve a sharp, stable image even when the sync level is too low, by restoring the sync signal waveform
- The cascade of up to eight units with control from a PC or serial controller
- Automatic switching mode (as well as the regular switching mode), automatically switching to the lowest number input when that input is connected and active

For example, if INPUT 6 is currently selected and connected and then INPUT 4 receives an active signal, the VP-81K automatically switches to INPUT 4.

Control the **VP-81K** using the front panel buttons, or remotely via:

- RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- Ethernet
- The Kramer **RC-IR3** Infrared Remote Control Transmitter or infrared remote extension cable transmitter (optional)

3.1 DDC Support

When establishing a VGA connection between a PC or laptop and a display device, a set of parameters known as EDID is exchanged between them, which is carried over the DDC channel. In some PC graphic cards and laptops, this information exchange is essential for proper VGA OUT operation.

3.2 Defining EDID

The Extended Display Identification Data (EDID) is a data-structure provided by a display, to describe its capabilities to a graphics card (that is connected to the display's source). The EDID enables the **VP-81K** to "know" what kind of monitor is connected to the output. The EDID includes the manufacturer's name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data.

EDID is defined by a standard published by the Video Electronics Standards Association (VESA).

3.3 Defining the VP-81K 8x1 UXGA/Audio Switcher

This section defines the **VP-81K**.

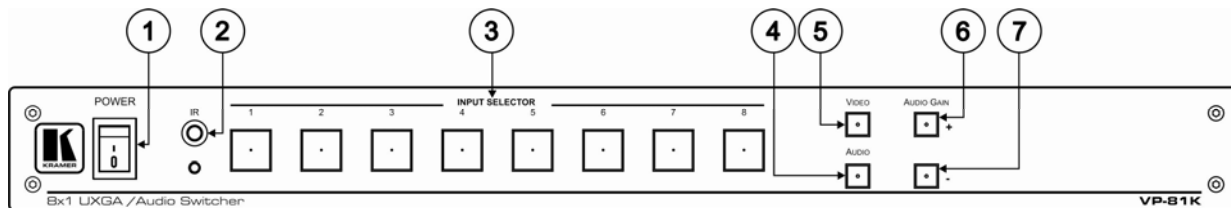


Figure 1: VP-81K 8x1 UXGA/Audio Switcher Front Panel

#	Feature	Function
1	POWER Switch	Illuminated switch supplying power to the unit
2	IR Receiver	The yellow LED is illuminated when receiving signals from the Kramer Infrared remote control transmitter
3	INPUT SELECTOR Buttons	Select the input (from 1 to 8) to switch to the outputs The button illuminates in red if it is selected and there is no input signal The button illuminates in green if it is not selected but there is an input signal at that input The button illuminates in violet if it is selected and there is an input signal connected
4	AUDIO Button	When illuminated, actions relate to audio If the AUDIO and VIDEO buttons both illuminate, the unit operates in the audio-follow-video mode
5	VIDEO Button	When illuminated, actions relate to video
6	AUDIO GAIN Buttons	+
7		-
		Press to increase the audio output level of the selected input (while the AUDIO button illuminates)
		Press to decrease the audio output level of the selected input

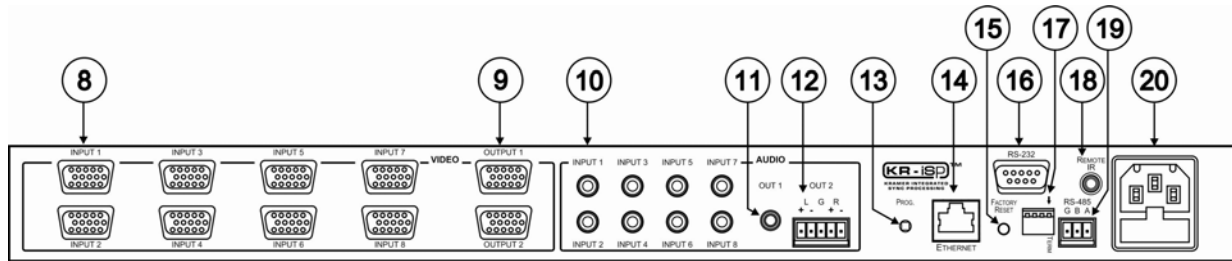


Figure 2: VP-81K 8x1 UXGA/Audio Switcher Rear Panel

#	Feature	Function
8	INPUT 15-pin HD Connectors	Connect to the UXGA sources (from 1 to 8)
9	OUTPUT 15-pin HD Connectors	Connect to the UXGA acceptors (from 1 to 2)
10	AUDIO INPUT Mini Plug Connectors	Connect to the unbalanced stereo audio sources (from 1 to 8)
11	OUT 1 Mini Plug Connector	Connect to the unbalanced stereo audio acceptor
12	OUT 2 Terminal Block Connector	Connect to the balanced stereo audio acceptor
13	PROG. Button	Not used (for technical staff use only)
14	Ethernet Connector	Connects to the PC or other Serial Controller through computer networking
15	FACTORY RESET Button	Press to reset to factory default definitions: IP number – 192.168.1.39 Mask – 255.255.255.0 Gateway – 192.168.1.1 The audio gain of all the inputs is reset to 0dB Turn the machine OFF, then turn the machine ON while pressing the FACTORY RESET button. The unit powers up and loads its memory with the factory default definitions
16	RS-232 9-pin D-sub Port	Connects to the RS-232 9-pin D-sub port of the next unit in the daisy-chain
17	SETUP DIP-switches	DIP-switches for setup of the unit, see Section 5.5
18	REMOTE IR 3.5mm Mini Jack	Connect to an external IR receiver unit for controlling the machine via an IR remote controller (instead of using the front panel IR receiver) Can be used instead of the front panel (built-in) IR receiver to remotely control the machine, see Section 3.4
19	RS-485 Detachable Terminal Block Port	Pin # 1 is for ground connection, and Pins # 2 and # 3 are for RS-485
20	Power Connector with Fuse	AC connector enabling power supply to the unit

3.4 Using the IR Transmitter

You can use the **RC-IR3** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver (Model: C-A35M/IRR-50). The external IR receiver can be located up to 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables (Model: C-A35M/A35F-50).

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable (P/N: 505-70434010-S) with the 3.5mm connector that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm connector.

4 Installing in a Rack

This section provides instructions for rack mounting the unit.

Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)
HUMIDITY:	10% to 90%, RHL non-condensing



CAUTION!

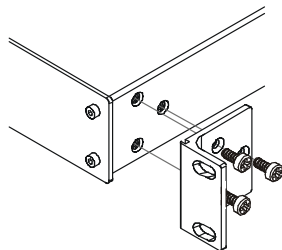
When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from: <http://www.kramerelectronics.com>

5 Connecting the VP-81K



Always switch off the power to each device before connecting it to your **VP-81K**. After connecting your **VP-81K**, connect its power and then switch on the power to each device.

To connect the **VP-81K**, as illustrated in the example in [Figure 3](#), do the following:

1. Connect up to eight UXGA computer graphics sources to the INPUT 15-pin HD connectors (from 1 to 8).
You do not have to connect all the inputs.
2. Connect the unbalanced audio sources to up to eight INPUT mini plug connectors.
Not shown in [Figure 3](#).
3. Connect the 15-pin HD OUTPUT connectors (from 1 to 2) to up to two UXGA acceptors (for example, a projector to OUTPUT 1 and a display to OUTPUT 2).
You do not have to connect both outputs.
4. Connect the OUT 1 unbalanced audio mini plug connector to an audio acceptor.
5. Connect the OUT 2 balanced audio terminal block connector (see [Section 5.1](#)) to an audio acceptor.
6. Set the DIP-switches (see [Section 5.5](#)).
7. As an option you can connect a PC and/or controller to the:
RS-232 port (see [Section 5.2](#))
RS-485 port (see [Section 5.3](#))
The Ethernet connector (see [Section 5.4](#))
8. Connect the power cord.
We recommend that you use only the power cord that is supplied with this machine.

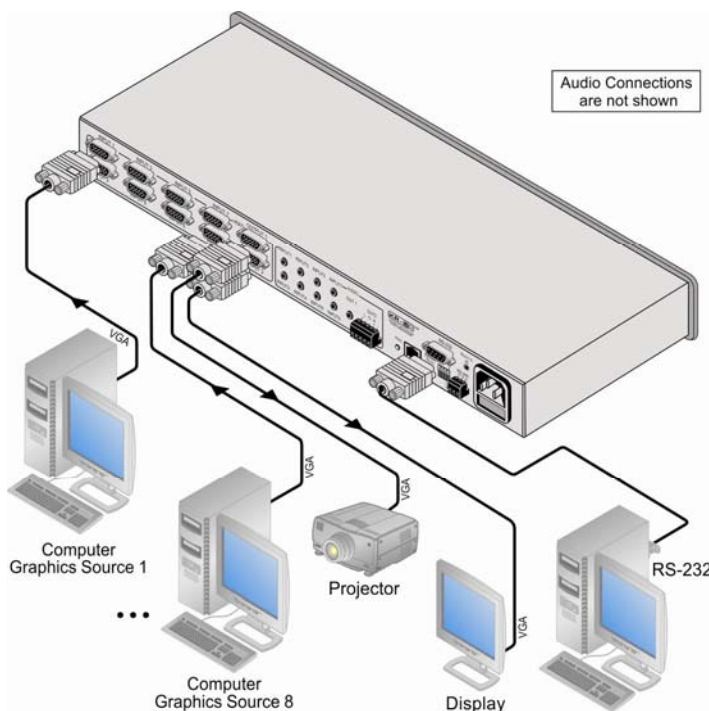


Figure 3: Connecting the VP-81K

5.1 Connecting the Balanced/Unbalanced Stereo Audio Output

This section illustrates how to wire a balanced output connection (see [Figure 4](#)) and an unbalanced audio output (see [Figure 5](#)).

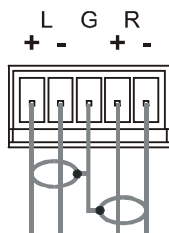


Figure 4: Connecting an Balanced Stereo Audio Output

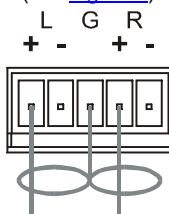


Figure 5: Connecting an Unbalanced Output

5.2 Controlling via RS-232

You can connect to the unit via a crossed RS-232 connection, using for example, a PC. A crossed cable or null-modem is required as shown in method A and B respectively. If a shielded cable is used, connect the shield to pin 5.

Method A (Figure 6)—Connect the RS-232 9-pin D-sub port on the unit via a crossed cable (only pin 2 to pin 3, pin 3 to pin 2, and pin 5 to pin 5 need be connected) to the RS-232 9-pin D-sub port on the PC.

Note: There is no need to connect any other pins.

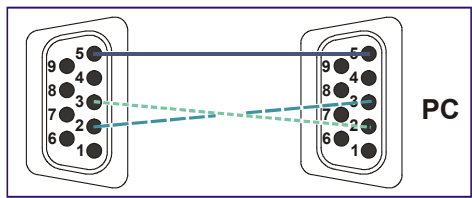


Figure 6: Crossed Cable RS-232 Connection

Hardware flow control is not required for this unit. In the rare case where a controller requires hardware flow control, short pin 1 to 7 and 8, and pin 4 to 6 on the controller side.

Method B (Figure 7)—Connect the RS-232 9-pin D-sub port on the unit via a straight (flat) cable to the null-modem adapter, and connect the null-modem adapter to the RS-232 9-pin D-sub port on the PC. The straight cable usually contains all nine wires for a full connection of the D-sub connector. Because the null-modem adapter (which already includes the flow control jumpering described in Method A above) only requires pins 2, 3 and 5 to be connected, you are free to decide whether to connect only these 3 pins or all 9 pins.

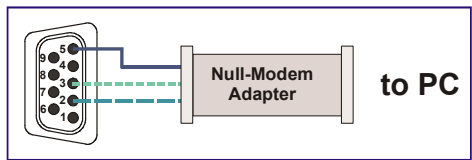


Figure 7: Straight Cable RS-232 Connection with a Null Modem Adapter

5.3 Connecting a PC or Controller to the RS-485 Port

You can operate the **VP-81K** via the RS-485 port from a distance of up to 1200m (3900ft) using any device equipped with an RS-485 port (for example, a PC). For successful communication, you must set the RS-485 machine number and bus termination.

To connect a device with a RS-485 port to the **VP-81K**:

- Connect the A (+) pin on the RS-485 port of the PC to the A (+) pin on the RS-485 port on the rear panel of the **VP-81K**
- Connect the B (–) pin on the RS-485 port of the PC to the B (–) pin on the RS-485 port on the rear panel of the **VP-81K**
- Connect the G pin on the RS-485 port of the PC to the G pin on the RS-485 port on the rear panel of the **VP-81K**

5.4 Controlling the VP-81K via the Ethernet Port

You can connect the **VP-81K** via the Ethernet in the following ways:

- For direct connection to the PC, use a crossover cable (see [Section 5.4.1](#))
- For connection via a network hub or network router, use a straight-through cable (see [Section 5.4.2](#))

5.4.1 Connecting the Ethernet Port Directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **VP-81K** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the **VP-81K** with the factory configured default IP address

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.

3. Right-click Local Area Connection Properties.

4. Select **Properties**.

The Local Area Connection Properties window appears.

5. Select the **Internet Protocol (TCP/IP)** and click the **Properties** Button (see [Figure 8](#)).

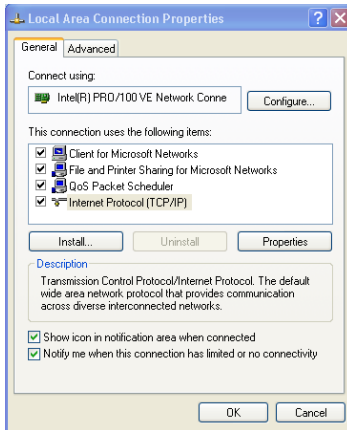


Figure 8: Local Area Connection Properties Window

6. Select **Use the following IP address**, and fill in the details as shown in [Figure 9](#).

7. Click **OK**.

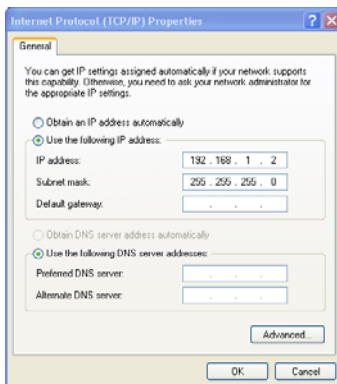


Figure 9: Internet Protocol (TCP/IP) Properties Window

5.4.2 Connecting via a Straight-Through Cable

You can connect the Ethernet of the **VP-81K** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

5.4.3 Configuring the Ethernet Port

To configure the Ethernet port, download the *P3K Wizard* Ethernet configuration software. Extract the file to a folder and create a shortcut on your desktop to the file.

Follow these steps to configure the port:

1. Double click the desktop icon.

The Connect screen appears as follows:

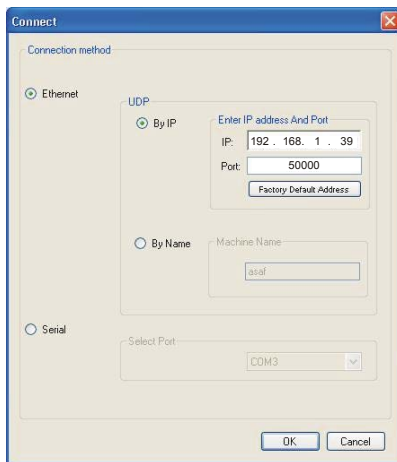


Figure 10: Connect Screen

2. Select the method to connect to the Ethernet port of the **VP-81K**.
Select:
 - Ethernet, if you know the IP address number or the machine name.
The default name for the machine is KRAMER_XXXX.
The four digits are the last four digits of the machine's serial number.
 - Serial, if you are connected via a serial port

3. Click **OK**.

The P3K Wizard screen appears.

Do not use P3K Wizard to upgrade the firmware. To upgrade the firmware, see the document "Upgrading the VP-81K Firmware" on the Kramer Web site.

Figure 11: Device Properties Screen

4. If required, make changes and click **Set**. If not, click **Close**.

5.4.4 Controlling via the Embedded Web Pages

The embedded Web page can be used to remotely operate the **VP-81K** via the Ethernet.

Before you use the embedded Web pages to control the **VP-81K** via the Ethernet, check that the Java™ software is installed on your computer. If not, download it from: www.java.com.

To control the **VP-81K** via the embedded Web page, make sure that it is connected to the Ethernet port of your computer and do the following:

1. Open your Internet browser.
2. Type the unit's IP number in the Address bar of your browser:
The default IP number is 192.168.1.39, and may be changed by the system integrator.



A Warning-Security screen appears:



3. Click **Run**.

The **VP-81K** front panel is displayed on your screen (see [Figure 12](#)).

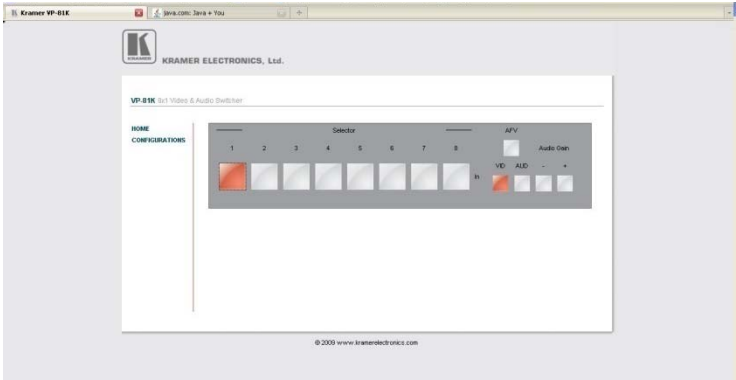


Figure 12: HOME Embedded Web Page

4. Click the on-screen buttons to control the unit.

The CONFIGURATIONS page lets you view some Ethernet settings (the model name, serial number, firmware version and MAC address) and change others (see [Figure 13](#)).

To change CONFIGURATION definitions:

1. Click **CONFIGURATIONS**.

The CONFIGURATIONS Web page appears.

2. Change the definitions as required.

3. Click the **Submit** button to apply changes, or **Cancel** to cancel changes.
A window appears asking if you are sure you want to change the network settings.

4. Click **Yes**.

A window appears announcing that the configuration has been successfully changed.

5. Click **OK**.

6. If the IP number had been changed, close the browser and reload the Web page.

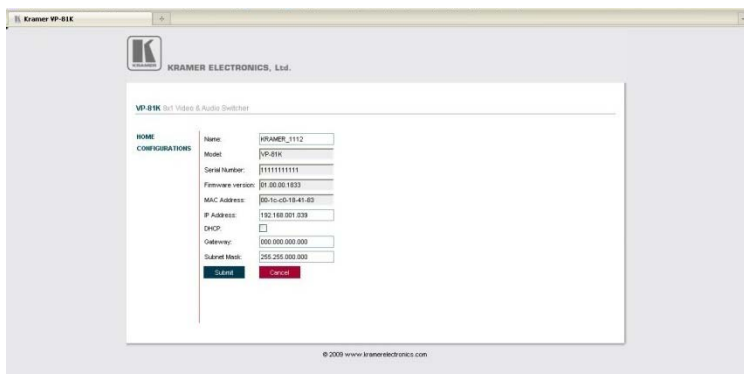


Figure 13: CONFIGURATIONS Embedded Web Page

5.5 DIP-Switch Settings

Figure 14 defines the DIP-switches:



Figure 14: SETUP DIP-Switches

DIP	Function
1-3	Machine #: determines the number of the machine in the sequence
4	ON for RS-485 Line Termination with 120Ω; OFF for no RS-485 Line Termination (see Section 5.3)

5.5.1 Setting the MACHINE

The following table defines the machine number DIP-switch settings. The Machine # determines the position of a **VP-81K** unit, when controlling several units via RS-232 or RS-485.

MACHINE # DIP-Switch Settings			
MACHINE #	DIP 1	DIP 2	DIP 3
1	OFF	OFF	OFF
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	ON	ON
5	ON	OFF	OFF
6	ON	OFF	ON
7	ON	ON	OFF
8	ON	ON	ON

5.6 Cascading Machines

You can cascade up to eight **VP-81K** units with control from a PC or serial controller (see [Figure 15](#)).

To cascade up to eight individual **VP-81K** units via RS-485, do the following:

1. Connect the computer graphics sources and acceptors, as described in [Section 5](#).
2. Connect the RS-232 port to the first **VP-81K** unit to the PC using the null-modem adapter provided with the machine (recommended), as [Section 5.2](#) describes.
Alternatively, the RS-485 port could be used for PC control (instead of RS-232).
3. Connect the RS-485 terminal block port on the first unit to the RS-485 port on the second **VP-81K** unit and so on, connecting all the RS-485 ports.
4. Set the DIP-switches, as [Section 5.2](#) describes:
 - Set the first **VP-81K** unit as Machine # 1 and the following seven **VP-81K** units as Machine # 2 to Machine # 8
 - Set DIP 4 ON on the first and last **VP-81K** units (terminating the RS-485 line at 120 Ω). Set DIP 4 OFF on the other **VP-81K** units

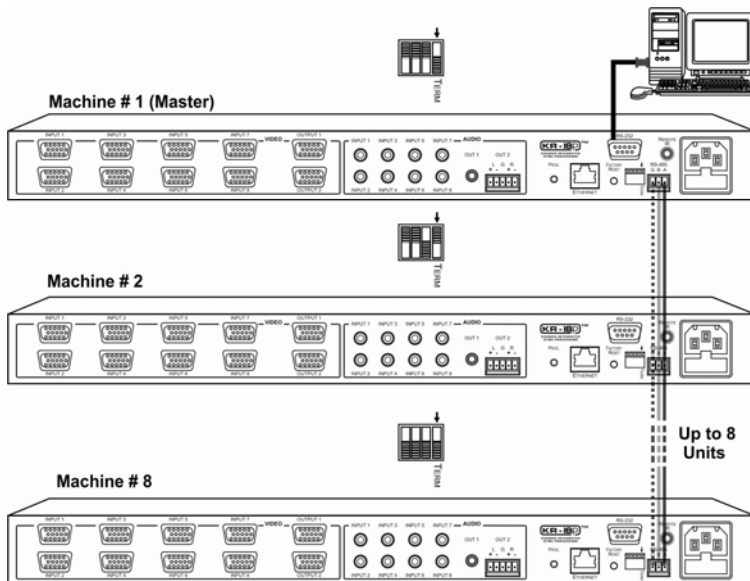


Figure 15: Control Configuration via RS-232 and RS-485

6 Operating Your VP-81K 8x1 UXGA/Audio Switcher

You can operate your **VP-81K** via:

- The front panel INPUT SELECTOR buttons, as [Section 6.1](#) describes
- Remotely, by RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Ethernet
- Remotely, from the Kramer **RC-IR3** Infrared Remote Control Transmitter (refer to the **RC-IR3** User Manual) or the infrared remote extension cable transmitter

Powering up **VP-81K** unit, recalls the previous settings (that is, the state of the unit when it was powered down) from the non-volatile memory.

6.1 Using the Front Panel Input Selector Buttons

The following table describes the INPUT SELECTOR button illumination definitions.

Button Color	Selected	Input Signal
Red	Yes	No
Green	No	Yes
Violet	Yes	Yes

To switch an input to the outputs, press one of the eight front panel INPUT SELECTOR buttons on the front panel of the **VP-81K**. The INPUT SELECTOR button illuminates and routes that input simultaneously to both outputs. You can switch off the output by concurrently pressing and holding a selected input button.

6.2 Using the Regular or Automatic Switching Mode

You can set the machine to either the regular switching mode (see [Section 6.2.1](#)) or the automatic switching mode (see [Section 6.2.2](#)). By default, the machine is set to the regular switching mode.

6.2.1 The Regular Switching Mode

You can set the machine to the regular switching mode by simultaneously pressing and holding the VIDEO and INPUT 7 buttons for 2 seconds.

In the regular switching mode, all switching operations are performed manually.

6.2.2 The Automatic Switching Mode

You can set the machine to the automatic switching mode by simultaneously pressing and holding the VIDEO and INPUT 8 buttons for 2 seconds.

In the automatic switching mode, the machine automatically switches to the lowest active INPUT video channel which is connected.

The following examples clarify the automatic switching mode:

- If input 6 is connected and active and input 4 is then connected (and active), the machine automatically switches to input 4
- If input 6 is connected but not active and input 7 is then connected and active, the machine automatically switches to input 7 which is the active input with the lowest number
- If input 2 is active and connected and input 7 is then connected and active, the machine remains switched to input 2 since it has the highest switching priority (the lowest active and connected input number)

Other switching operations are performed manually.

6.3 Using the Audio-Follow-Video/Breakaway Modes

By default, the **VP-81K** switches in true audio-follow-video mode in which all operations relate to both the video and audio. Both the VIDEO and the AUDIO buttons illuminate in this mode.

6.3.1 Operating in Breakaway Mode

To operate in breakaway mode, in which video and audio channels switch independently:

- Press either the VIDEO button or the AUDIO button (only one button, the VIDEO button or the AUDIO button illuminate at this time)
If the VIDEO button illuminates, the switching relates just to video (and the audio remains unchanged)
If the AUDIO button illuminates, the switching relates only to audio (and the video remains unchanged)

6.3.2 Toggling between Video and Audio Control in Breakaway Mode

To toggle between video and audio control, press the corresponding button:

- For audio, press the AUDIO button
This selects audio, illuminating the AUDIO button (the VIDEO button will not illuminate), or
- For video, press the VIDEO button
This selects video, illuminating the VIDEO button (the AUDIO button will not illuminate)

6.3.3 Operating in the Audio-Follow-Video Mode

To operate in audio-follow-video (AFV) mode, press both the VIDEO and the AUDIO buttons simultaneously.

In AVF mode the AUDIO and VIDEO buttons both illuminate. If only one button illuminates (AUDIO or VIDEO), the unit operates in the breakaway mode

6.4 Setting the Audio Gain

You can increase/decrease the output (from -36dB to 6dB) using the AUDIO GAIN + and - buttons. Also you can set the audio gain for each input individually using IR remote control or RS-232/Ethernet protocol commands.

7 Technical Specifications

INPUTS:	8 UXGA on 15-pin HD connectors (VGA through UXGA); 8 unbalanced audio stereo signals on 3.5mm mini plug connectors	
OUTPUTS:	2 UXGA on 15-pin HD connectors (VGA through UXGA); 1 unbalanced audio stereo signal on a 3.5mm mini plug connector; 1 balanced audio stereo signal on a detachable terminal block	
MAX. OUTPUT LEVEL:	VIDEO: 1.9Vpp	AUDIO: 19.5Vpp, maximum gain
BANDWIDTH (-3dB):	VIDEO: >325MHz	AUDIO: 30kHz
DIFF. GAIN	0.05%	
DIFF PHASE	0.05 Deg.	
S/N RATIO:	VIDEO: 73dB @5MHz	AUDIO: >70dB
CROSSTALK (all hostile):	VIDEO: -50dB @5MHz	AUDIO: -82dB @1kHz
CONTROLS:	Audio level buttons: -80dB to 5dB, audio and video select buttons, front panel selector switches; RS-232, RS-485; IR remote control;	
COUPLING:	VIDEO: DC	AUDIO: AC
AUDIO THD + NOISE:	<0.2%	
AUDIO 2nd HARMONIC:	<0.04%	
POWER SOURCE:	110-230V AC, 50/60Hz, 8VA max	
DIMENSIONS:	19" x 7" x 1U (W, D, H) rack-mountable	
WEIGHT:	2.7kg (6lbs) approx.	
ACCESSORIES:	Power cord, null-modem adapter, Windows®-based Kramer control software, infrared remote control transmitter	
OPTIONS:	External remote IR receiver cable (C-A35M/IRR-50); 15 meter extension cable (C-A35M/A35F-50)	
Specifications are subject to change without notice at http://www.kramerelectronics.com		

8 Communication Parameters

The following table lists the communication parameters as used in Kramer Electronics products.

RS-232			
Protocol 2000		Protocol 3000 (Default)	
Baud Rate:	9600	Baud Rate:	115,200
Data Bits:	8	Data Bits:	8
Stop Bits:	1	Stop Bits:	1
Parity:	None	Parity:	None
Command Format:	HEX	Command Format:	ASCII
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81	Example (Output 1 to Input 1):	#AV 1>1<CR>
Switching Protocol			
P2000 -> P3000		P3000 -> P2000	
Command:	0x38, 0x80, 0x83, 0x81	Command:	#P2000<CR>
Front Panel:	Press and hold Output 1 and Output 3 simultaneously	Front Panel:	Press and hold Output 1 and Output 2 simultaneously
Ethernet Factory Default Values			
IP Address: 192.168.1.39		Power cycle the unit while pressing the Factory Reset button, located on the rear panel of the unit.	
Mask: 255.255.255.0			
Gateway: 192.168.1.1			
TCP Port #: 5000			
UDP Port #: 50000			

9 Table of ASCII Codes for Serial Communication (Protocol 3000)

The following table lists the ASCII values to switch an input to an output for a single **VP-81K** device. For more detailed information, see [Section 11.2](#).

	Video	Audio
IN 1	#V 1>1 CR	#A 1>1 CR
IN 2	#V 2>1 CR	#A 2>1 CR
IN 3	#V 3>1 CR	#A 3>1 CR
IN 4	#V 4>1 CR	#A 4>1 CR
IN 5	#V 5>1 CR	#A 5>1 CR
IN 6	#V 6>1 CR	#A 6>1 CR
IN 7	#V 7>1 CR	#A 7>1 CR
IN 8	#V 8>1 CR	#A 8>1 CR

The following table lists the codes that set the audio input gain. For more detailed information, see [Section 11.2](#).

INPUT 1	INPUT 5	INPUT X*	Level [Rel]
#AUD-LVL 1,1, -21 CR	#AUD-LVL 1,5, -21 CR	#AUD-LVL 1,X, -21 CR	-21dB
#AUD-LVL 1,1, 0 CR	#AUD-LVL 1,5, 0 CR	#AUD-LVL 1,X, 0 CR	0dB (max)

* Where X is the input number from 1 - 8. For example, for channel 7 and relative level -50dB, **#AUD-LVL 1,7, -50 CR**

The following table lists the codes that set the video and audio output gain. For more detailed information, see [Section 11.1.2](#).

OUTPUT 1	Level [Rel]
#AUD-LVL 2,1, -36 CR	-36dB
#AUD-LVL 2,1, 0 CR	0dB
#AUD-LVL 2,1, 6 CR	+6dB

10 Table of Hex Codes for Serial Communication (Protocol 2000)

The following table lists the Hex values to switch an input to an output for a single **VP-81K** machine. For more detailed information, see [Section 11.3](#)).

	Video	Audio
IN 1	01, 81, 81, 81	02, 81, 81, 81
IN 2	01, 82, 81, 81	02, 82, 81, 81
IN 3	01, 83, 81, 81	02, 83, 81, 81
IN 4	01, 84, 81, 81	02, 84, 81, 81
IN 5	01, 85, 81, 81	02, 85, 81, 81
IN 6	01, 86, 81, 81	02, 86, 81, 81
IN 7	01, 87, 81, 81	02, 87, 81, 81
IN 8	01, 88, 81, 81	02, 88, 81, 81

The following table lists the hex codes that increase or decrease audio input gain.

	IN 1	IN 2	IN 3	IN 4	IN 5	IN 6	IN 7	IN 8
Increase	18 81 86 81	18 82 86 81	18 83 86 81	18 84 86 81	18 85 86 81	18 86 86 81	18 87 86 81	18 88 86 81
Decrease	18 81 87 81	18 82 87 81	18 83 87 81	18 84 87 81	18 85 87 81	18 86 87 81	18 87 87 81	18 88 87 81

The following table lists the hex codes that set the audio input gain.

Note: Before sending any of these codes, the command **2A 86 80 81** must be sent.

IN 1	IN 2	IN 3	IN 4	IN 5	IN 6	IN 7	IN 8	Level [Rel]
16 81 80* 81	16 82 80* 81	16 83 80* 81	16 84 80* 81	16 85 80* 81	16 86 80* 81	16 87 80* 81	16 88 80* 81	-21dB
16 81 AB* 81	16 82 AB* 81	16 83 AB* 81	16 84 AB* 81	16 85 AB* 81	16 86 AB* 81	16 87 AB* 81	16 88 AB* 81	0dB (max)

* BYTE 3 = 0x80 + Gain Value (0x00-0x2B)

The following table lists the hex codes that increase or decrease the audio output gain.

	OUT 1	OUT 2	OUT 3	OUT 4	OUT 5	OUT 6	OUT 7	OUT 8
Increase	18 81 80 81	18 82 80 81	18 83 80 81	18 84 80 81	18 85 80 81	18 86 80 81	18 87 80 81	18 88 80 81
Decrease	18 81 81 81	18 82 81 81	18 83 81 81	18 84 81 81	18 85 81 81	18 86 81 81	18 87 81 81	18 88 81 81

The following table lists the hex codes that set the audio output gain. Before sending the any of these codes, the command **2A 87 80 81** must be sent.

OUT 1	Level [Rel]
16 81 80* 81	-36dB
16 81 C8* 81	0dB
16 81 D4* 81	+6dB

*BYTE 3 = 0x80 + Gain Value (0x00-0x54)

11 Kramer Protocol

[Section 11.1](#) describes how to switch between Protocol 3000 and Protocol 2000.

You can download our user-friendly “Software for Calculating Hex Codes for Protocol 2000” from the technical support section at <http://www.kramerelectronics.com>

By default, the VP-81K is set to protocol 3000 (see [Section 11.2](#)) but is also compatible with Kramer’s Protocol 2000 (see [Section 11.3](#)).

11.1 Switching Protocols

You can switch protocols either via the front panel buttons (see [Section 11.1.1](#)) or the protocol commands (see [Section 11.1.2](#)).

11.1.1 Switching Protocols via the Front Panel Buttons

To switch from protocol 3000 to protocol 2000 via the:

- Front panel buttons, press the IN 1 and IN 2 button simultaneously

To switch from protocol 2000 to protocol 3000 via the:

- Front panel buttons, press the IN 1 and IN 3 button simultaneously

11.1.2 Switching Protocols via Protocol Commands

To switch from protocol 3000 to protocol 2000, send the following command:

#P2000<CR>

To switch from protocol 2000 to protocol 3000, send the following command:

0x38, 0x80, 0x83, 0x81



The Windows®-based Kramer control software operates with Protocol 2000. If the **VP-81K** is set to Protocol 3000, it is automatically switched to Protocol 2000.

Download the latest software from our Web site at <http://www.kramerelectronics.com>.

11.2 Kramer Protocol 3000

This RS-232/RS-485/Ethernet communication protocol lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application).

11.2.1 Protocol 3000 Syntax

Host message format:

Start	Address (optional)	Body	Delimiter
#	<i>Destination_id@</i>	message	CR

Simple command (commands string with only one command without addressing):

Start	Body	Delimiter
#	Command SP Parameter_1,Parameter_2,	CR

Command string (formal syntax with commands concatenation and addressing):

Address@ **Command_1** *Parameter1_1,Parameter1_2,* |*Command_2*
Parameter2_1,Parameter2_2, |*Command_3* *Parameter3_1,Parameter3_2,*
| **CR**

Device message format:

Start	Address (optional)	Body	Delimiter
~	<i>Sender_id@</i>	message	CR LF

Device long response (**Echoing command**):

Start	Address (optional)	Body	Delimiter
~	<i>Sender_id@</i>	command SP [<i>param1 ,param2</i>] result	CR LF

CR = Carriage return (ASCII 13 = 0x0D)

LF = Line feed (ASCII 10 = 0x0A)

SP = Space (ASCII 32 = 0x20)

11.2.2 Command Part Details

Command:

Sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').
Command will separate from parameters with at least single space.

Parameters:

Sequence of Alfa-Numeric ASCII chars ('0'-'9','A'-'Z','a'-'z' and some special chars for specific commands), parameters will be separated by commas.

Message string:

Every command must be entered as part of message string that begin with message starting char and end with message closing char, note that string can contain more then one command separated by pipe ("|") char.

Message starting character:

'#' for host command/query.
'~' for machine response.

Device address (optional, for K-Net):

K-Net Device ID follow by '@' char.
Query sign = '?', will follow after some commands to define query request.
Message closing char =
Host messages - Carriage Return (ASCII 13), will be referred to by **CR** in this document.
Machine messages - Carriage Return (ASCII 13) + Line-Feed (ASCII 10), will be referred to by **CRLF**.
Spaces between parameters or command parts will be ignored.

Command chain separator char:

When message string contains more than one command, commands will be separated by pipe ("|").

Command entering:

If terminal software used to connect over serial \ ethernet \ USB port, that possible to directly enter all commands characters (**CR**) will be entered by Enter key, that key send also **LF**, but this char will be ignored by commands parser).
Sending commands from some controllers (like Crestron) require coding some characters in special form (like \X##). Anyway, there is a way to enter all ASCII characters, so it is possible to send all commands also from controller.
(Similar way can use for URL \ Telnet support that maybe will be added in future).

Command forms:

Some commands have short name syntax beside the full name to allow faster typing, response is always in long syntax.

Command chaining:

It is possible to enter multiple commands in same string by '|' char (pipe).
In this case the message starting char and the message closing char will be entered just one time, in the string beginning and at the end.
All the commands in string will not execute until the closing char will be entered.
Separate response will be sent for every command in the chain.

Input string max length:

64 characters.

Backward support:

Design note: transparent supporting for protocol 2000 will be implemented by switch protocol command from protocol 3000 to protocol 2000, in protocol 2000 there is already such a command to switch protocol to ASCII protocol (#56 : H38 H80 H83 H81).

Help Commands		
Command	Syntax	Response
Protocol Handshaking	# CR	~OK CRLF

Device Initiated Messages	
Command	Syntax
Start message	Kramer Electronics LTD. , Device Model Version Software Version

Switcher Actions	
Audio-video channel has switched (AFV mode)	AV [IN>OUT]
Video channel has switched (Breakaway mode)	VID [IN>OUT]
Audio channel has switched (Breakaway mode)	AUD [IN>OUT]

Result Codes (Errors)	
	Syntax
No error. Command running succeeded	[COMMAND] [PARAMETERS] OK
Protocol Errors	
Syntax Error	ERR001
Command not available for this device	ERR002
Parameter is out of range	ERR003
Unauthorized access (running command without the match login).	ERR004

Basic Routing Commands		
Command	Syntax	Response
Switch audio & video	AV [IN>OUT] , [IN>OUT] .	AV [IN>OUT] , [IN>OUT] , [RESULT]
Switch video only	VID [IN>OUT] , [IN>OUT] , Short form: V [IN>OUT] , [IN>OUT] .	VID [IN>OUT] , [IN>OUT] , [RESULT]
Note: When AFV mode is active, this command will switch also audio. If audio is breakaway – device display mode will change to show audio connections status.		
Switch audio only	AUD [IN>OUT] , [IN>OUT] , Short form: A [IN>OUT] , [IN>OUT] .	AUD [IN>OUT] , [IN>OUT] , [RESULT]
Note: When AFV mode is active, this command will switch also video.		
Read video connection	VID? [OUT] Short form: V? [OUT] VID? *	VID [IN>OUT] VID [IN>1] , [IN>2] .
Read audio connection	AUD? [OUT] Short form: A? [OUT] AUD? *	AUD [IN>OUT] AUD [IN>1] , [IN>2] .
Parameters Description: [IN] = Input number or '0' to disconnect output. '>' = Connection character between in and out parameters. [OUT] = Output number or '*' for all outputs.		
Examples:		
Switch Video and Audio input 3 to output 7	#AV 3>7 [CR]	~AV 3>7 OK [CRLF]
Switch Video input 2 to output 4	#V 2>4 [CR]	~VID 2>4 OK [CRLF]
Switch Video input 4 to output 2 in machine number 6	#6@VID 4>2 [CR]	~6@VID 4>2 OK [CRLF]
Disconnect Video and Audio Output 4	#AV 0>4 [CR]	~AV 0>4 OK [CRLF]
Switch Video Input 3 to All Outputs	#V 3>* [CR]	~VID 3>* OK [CRLF]

Chaining Multiple commands*	<p>#AV 1>* V 3>4, 2>2, 82>1, 0>2 V 82>3 A 0>1 V? * CR</p> <p>First switch all Audio and video outputs from input 1, Then switch video input 3 to output 4, video input 2 to output 2, video input and disconnect video output 2.</p> <p>Then switch audio input 3 to output 2, Then disconnect audio output 1. Then get status of all links (assume this is 4x4 matrix). Commands processing start after entering CR, response will sent for each command after processing it.</p>	<p>~AV 1>* OKCRLF</p> <p>~VID 1>2, 3>4 OKCRLF</p> <p>~VID 82>3 ERR### CRLF</p> <p>~AUD 0>1 OKCRLF</p> <p>~V 1>1, 0>2, 1>3, 3>4 CRLF</p>
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Signal Status Commands		
Command	Syntax	Response
Change signal status	-----	SIGNAL INPUT , STATUS
Get signal status	SIGNAL? INPUT	SIGNAL INPUT , STATUS
Parameter Description: INPUT = Input number, '*' for all. STATUS = Signal state: "0" or "off" for not existent signal. "1" or "on" for existent signal.		

Preset Commands		
Command	Syntax	Response
Store current connections to preset	PRST-STO PRESET Short form: PSTO PRESET	PRST-STO PRESET RESULT
Recall saved preset	PRST-RCL PRESET Short form: PRCL PRESET	PRST-RCL PRESET RESULT
Delete saved preset	PRST-DEL PRESET Short form: PDEL PRESET	PRST-DEL PRESET RESULT
Read video connections from saved preset	PRST-VID? PRESET OUT Short form: PVID? PRESET OUT PRST-VID? PRESET *	PRST-VID PRESET , IN > OUT PRST-VID PRESET , IN >1, IN >2,
Read audio connections from saved preset	PRST-AUD? PRESET OUT Short form: PAUD? PRESET OUT PRST-AUD? PRESET , *	PRST-AUD PRESET , IN > OUT PRST-AUD PRESET , IN >1, IN >2,
Read saved presets list	PRST-LST? Short form: PLST?	PRST-LST PRESET , PRESET ,
Parameters Description: PRESET = Preset number. OUT = Output in preset to show for, '*' for all.		
Examples:		
Store current Audio & Video connections to preset 5	#PRST-STR 5 CR	~PRST-STR 5 OK CRLF
Recall Audio & Video connections from preset 3	#PRCL 3 CR	~PRST-RCL 3 OK CRLF
Show source of video output 2 from preset 3	#PRST-VID? 3,2 CR	~PRST-VID 3: 4>2 CRLF

Operation Commands		
Command	Syntax	Response
Lock front panel	LOCK-FP <u>LOCK-MODE</u> Short form: LCK <u>LOCK-MODE</u>	LOCK-FP <u>LOCK-MODE</u> <u>RESULT</u>
Get front panel locking state	LOCK-FP?	LOCK-FP <u>LOCK-MODE</u>
Parameters Description: LOCK-MODE = Front panel locking state: "0" or "off" to unlock front panel buttons. "1" or "on" to lock front panel buttons.		
Restart device	RESET	RESET OK
Switch to protocol 2000*	P2000	P2000 OK
* Protocol 2000 has command to switch back to ASCII protocol (like protocol 3000)		

Audio Parameter Commands		
Command	Syntax	Response
Set audio level in specific amplifier stage.	AUD-LVL <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u> Short form: ADL <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u>	AUD-LVL <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u> <u>RESULT</u>
Read audio volume level	AUD-LVL? <u>STAGE</u> <u>CHANNEL</u> Short form: ADL? <u>STAGE</u>	AUD-LVL <u>STAGE</u> <u>CHANNEL</u> <u>VOLUME</u>
Mute audio	MUTE <u>MUTE-MODE</u>	MUTE <u>MUTE-MODE</u> <u>RESULT</u>
Parameter Description: STAGE = "In", "Out" or Numeric value (present audio processing stage). For example: "1" for Input level, "2" for Amplifier (Out) etc. CHANNEL = Input or Output # VOLUME = Audio parameter in Kramer units, precede minus sign for negative values. ++ increase current value -- decrease current value MUTE MODE = 1 – Mute 0 – Unmute		

Machine Info Commands		
Command	Syntax	Response
* Time setting commands require admin authorization		
Read in/out count	INFO-IO?	INFO-IO: IN <u>INPUTS_COUNT</u> OUT <u>OUTPUTS_COUNT</u>
Read max preset count	INFO-PRST?	INFO-PRST: VID <u>PRESET_VIDEO_COUNT</u> AUD <u>PRESET_AUDIO_COUNT</u>
Reset configuration to factory default	FACTORY	FACTORY <u>RESULT</u>

Identification Commands		
Command	Syntax	Response
Protocol Handshaking	#CR	~OK <u>CRLF</u>
Read device model	MODEL?	MODEL <u>MACHINE_MODEL</u>

Identification Commands		
Command	Syntax	Response
Read device serial number	SN?	SN <u>SERIAL_NUMBER</u>
Read device firmware version	VERSION?	VERSION <u>MAJOR</u> <u>MINOR</u> <u>BUILD</u> <u>REVISION</u>
Set machine name	NAME <u>MACHINE_NAME</u>	NAME <u>MACHINE_NAME</u> <u>RESULT</u>
Read machine name	NAME?	NAME <u>MACHINE_NAME</u>
Reset machine name to factory default*	NAME-RST	NAME-RST <u>MACHINE_FACTORY_NAME</u> <u>RESULT</u>
<p>*Note: machine name not equal to model name. This name relevance for site viewer identification of specific machine or for network using (with DNS feature on). <u>MACHINE_NAME</u> = Up to 14 Alfa-Numeric chars. * Machine factory name = Model name + last 4 digits from serial number.</p>		
Set machine id number	MACH-NUM <u>MACHINE_NUMBER</u>	MACH-NUM <u>OLD_MACHINE_NUMBER</u> <u>NEW_MACHINE_NUMBER</u> <u>RESULT</u>
<p>* Response will send after machine number has been changed. So the replay with header will be: <u>NEW_MACHINE_NUMBER</u> @MACH-NUM <u>OLD_MACHINE_NUMBER</u> <u>NEW_MACHINE_NUMBER</u> OK</p>		

Network Setting Commands		
Set IP Address	NET-IP <u>IP_ADDRESS</u> NTIP	NET-IP <u>IP_ADDRESS</u> <u>RESULT</u>
Read IP Address	NET-IP? NTIP?	NET-IP <u>IP_ADDRESS</u>
Read MAC Address	NET-MAC? NTMC	NET-MAC <u>MAC_ADDRESS</u>
Set subnet mask	NET-MASK <u>SUBNET_MASK</u> NTMSK	NET-MASK <u>SUBNET_MASK</u> <u>RESULT</u>
Read subnet mask	NET-MASK? NTMSK?	NET-MASK <u>SUBNET_MASK</u>
Set gateway address	NET-GATE <u>GATEWAY_ADDRESS</u> NTGT	NET-GATE <u>GATEWAY_ADDRESS</u> <u>RESULT</u>
Read subnet mask	NET-GATE? NTGT?	NET-GATE <u>GATEWAY_ADDRESS</u>
Set DHCP mode	NET-DHCP <u>DHCP_MODE</u> NTDH	NET-DHCP <u>DHCP_MODE</u> <u>RESULT</u>
Read subnet mask	NET-DHCP? NTDH?	NET-DHCP <u>DHCP_MODE</u>
<p><u>DHCP_MODE</u> = 0 – Don't use DHCP (Use IP set by factory or IP set command). 1 – Try to use DHCP, if unavailable use IP as above.</p>		
Change protocol Ethernet port	ETH-PORT <u>PROTOCOL</u> <u>PORT</u> ETHP	ETH-PORT <u>PROTOCOL</u> <u>PORT</u> <u>RESULT</u>
Read protocol Ethernet port	ETH-PORT? <u>PROTOCOL</u> ETHP?	ETH-PORT <u>PROTOCOL</u> <u>PORT</u>
<p><u>PROTOCOL</u> = TCP / UDP (transport layer protocol) <u>PORT</u> = Ethernet port to enter protocol 3000 commands 1-65535 = User defined port 0 - reset port to factory default (50000 for UDP, 5000 for TCP)</p>		

Advanced Switching Commands		
Command	Syntax	Response
Set audio follow video mode	AFV <u>AFV-MODE</u>	AFV <u>AFV-MODE</u> <u>RESULT</u>
Note: This command effect device front-panel mode and AUD\VID command		
Read audio follow video mode	AFV?	AFV <u>AFV-MODE</u>
AFV-MODE = Front panel AFV mode "0" or "afv" to set front panel switching buttons in audio-follow-video state "1" or "brk" to set front panel switching buttons in their previous state when audio		

11.3 Kramer Protocol 2000

This RS-232/RS-485/Ethernet communication protocol (Version 0.5) uses four bytes of information as defined below. For RS-232, a null-modem connection between the machine and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 1: Protocol Definitions

MSB					LSB		
1 st byte	Destination	Instruction					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0

2d byte	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0

3d byte	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0

4 th byte	MACHINE NUMBER						
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0

1st BYTE: Bit 7 – Defined as 0.

D – “DESTINATION”: 0 - for sending information to the switchers (from the PC);

1 - for sending to the PC (from the switcher).

N5 N0 – “INSTRUCTION”

The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine’s keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5 N0).

2nd BYTE: Bit 7 – Defined as 1.

I6 I0 – “INPUT”.

When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched.

Similarly, if switching is done via the machine’s front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.

O6 O0 – “OUTPUT”.

When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched.

Similarly, if switching is done via the machine’s front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.

Bit 5 – Don’t care.

OVR – Machine number override.

M4 M0 – MACHINE NUMBER.

Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply.

For a single machine controlled via the serial port, always set M4 M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Note: All values in the table are decimal, unless otherwise stated.

Instruction		Definition For Specific Instruction		Notes (see below)
#	Description	Input	Output	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2
2	SWITCH AUDIO	Set equal to audio input which is to be switched (0 = disconnect)	Set equal to audio output which is to be switched (0 = to all the outputs)	2
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is required	4, 3
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #	Equal to output number whose status is required	4, 3
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
11	REQUEST BREAKAWAY SETTING	Set as SETUP #	0 - Request audio breakaway setting	3, 4, 6
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
16	ERROR / BUSY	For invalid / valid input (i.e. OUTPUT byte = 4 or OUTPUT byte = 5), this byte is set as the input #	0 - error 1 - invalid instruction 2 - out of range 3 - machine busy 4 - invalid input 5 - valid input 6 - RX buffer overflow	9, 25
22	SET AUDIO PARAMETER	Equal to input / output number whose parameter is to be set (0 = all)	Set as parameter value	2, 24
24	INCREASE / DECREASE AUDIO PARAMETER	Equal to input / output number whose parameter is to be increased / decreased (0 = all)	0 - increase output 1 - decrease output	2
25	REQUEST AUDIO PARAMETER	Equal to input / output number whose parameter is requested	0	6, 24
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
42	AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25	INPUT Bit: 10 - 0=input; 1=output 11 - Left 12 - Right	0 - Gain 1 - Bass 2 - Treble 3 - Midrange 4 - Mix On	24
56	CHANGE TO ASCII	0	Kramer protocol 3000	19
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio	14

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code

01 85 88 83

was sent from the PC, then the switcher (machine 3) will switch input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher will send HEX codes:

41 81 87 83

to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B 80 80 85

would be HEX codes

4B 80 81 85

NOTE 6 - If INPUT is set to 127 for these instructions, then, if the function is defined on this machine, it replies with OUTPUT=1. If the function is not defined, then the machine replies with OUTPUT=0, or with an error (invalid instruction code).

If the INPUT is set to 126 for these instructions, then, if possible, the machine will return the current setting of this function, even for the case that the function is not defined. For example, for a video switcher which always switches during the VIS of input #1, (and its VIS setting cannot be programmed otherwise), the reply to the HEX code

0A FE 80 81

would be HEX codes

4A FE 81 81 (i.e. VIS setting = 1, which is defined as VIS from input #1).

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

NOTE 9 - An error code is returned to the PC if an invalid instruction code was sent to the switcher, or if a parameter associated with the instruction is out of range (e.g. trying to save to a setup greater than the highest one, or trying to switch an input or output greater than the highest one defined). This code is also returned to the PC if an RS-232 instruction is sent while the machine is being programmed via the front panel. Reception of this code by the switcher is not valid.

NOTE 10 - This code is reserved for internal use.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

7D 96 90 81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D 83 85 81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D D9 C3 81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E 82 81 82 (i.e. request the number of outputs)

would be HEX codes

7E 82 90 82 (i.e. 16 outputs)

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

NOTE 19 - After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

NOTE 24 – Further information needed in instructions 21, 22, 25 and 26 is sent using instruction 42 – which is sent prior to the instruction. For example, to request the audio gain value of right input # 9, send hex codes

2A 84 80 81
 and then send HEX codes
 19 89 81 81.
 To set MIX mode, send hex codes
 2A 81 84 81
 and then send HEX codes
 16

NOTE 25 – For units which detect the validity of the video inputs, Instruction 16 will be sent whenever the unit detects a change in the state of an input (in real-time).

For example, if input 3 is detected as invalid, the unit will send the HEX codes

10 83 84 81
 If input 7 is detected as valid, then the unit will send HEX codes
 10 87 85 81.

LIMITED WARRANTY

We warrant this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by us or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
 - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
 - ii) Product modification, or failure to follow instructions supplied with the product
 - iii) Repair or attempted repair by anyone not authorized by Kramer
 - iv) Any shipment of the product (claims must be presented to the carrier)
 - v) Removal or installation of the product
 - vi) Any other cause, which does not relate to a product defect
 - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

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All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

- EN-50081: "Electromagnetic compatibility (EMC);
generic emission standard.
Part 1: Residential, commercial and light industry"
- EN-50082: "Electromagnetic compatibility (EMC) generic immunity standard.
Part 1: Residential, commercial and light industry environment".
- CFR-47: FCC* Rules and Regulations:
Part 15: "Radio frequency devices
Subpart B Unintentional radiators"

CAUTION!

■ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.

■ Use the supplied DC power supply to feed power to the machine.

■ Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)



For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.

Web site: www.kramerelectronics.com

E-mail: info@kramerel.com



SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing